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Comparison of tap block and epidural block in gynecologic oncology surgeries

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Abstract
Aim: Transversus abdominis plane (TAP) block and epidural analgesia may be helpful in relieving pain after surgical procedures in gynecological malignancies. In this retrospective cohort study, it was aimed to compare the analgesic efficacy of TAP block and epidural block in patients operated for gynecological malignancy.
Material and Methods: Medical files of 74 patients who underwent surgery for gynecological malignancy were retrospectively reviewed. All patients underwent gynecologic surgeries. Group I (n=25) received epidural analgesia, Group II (n=25) TAP block, and Group III (n=24) received no additional analgesic procedures. Baseline descriptors, visual analog scale for pain, Ramsay sedation score, operation and ICU length of stay, need for additional medication, and gastrointestinal symptoms were compared between groups.
Results: The level of pain relief, hemodynamic and respiratory parameters in the 3 operated groups were mostly similar. In patients <55 years of age, the Ramsay sedation scale was significantly higher 12 hours after surgery. In these patients (<55 years), additional drug use was needed more at the 12th hour. VAS scores at the 1st (p=0.024) and 2nd (p=0.004) hours were also higher in patients with a body mass index of >25.
Discussion: Our results showed that TAP block and epidural analgesia provide safe and effective methods for postoperative analgesia in gynecological malignancies.

Keywords
Surgical Oncology, Epidural Analgesia, Postoperative Pain, Transversus Abdominis

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Introduction

Dynamic analgesia is a critical factor for the success of enhanced recovery programs. There is a lack of consensus on the ideal analgesic technique after surgical procedures for gynecologic oncology [1]. Even though it was considered the gold standard, epidural analgesia is being replaced by other techniques with a better risk/benefit ratio. Transversus abdominis plane (TAP) blocks have gained popularity; however, they are unable to provide durable analgesia [2,3]. Another drawback with TAP blocks is their dermatomal limitation [4]. Recent studies demonstrated that patient-controlled epidural analgesia (PCEA) could decrease the total anesthetic need and reduce the workload of the medical staff. Maternal satisfaction was higher with PCEA than other techniques that did not involve patient participation. On the other hand, there is no consensus on patient selection criteria as well as the ideal route of delivery [5]. Epidural analgesia has been commonly used in anesthesiology practice except for patients with increased intracranial pressure, coagulation disorders, unwillingness for the procedure, uncompliance for intervention, local sepsis, and restricted experience. On the other hand, TAP block is a relatively novel mode that necessitates injection of the local anesthetic solution in the anterior abdominal wall [6]. Even though TAP is a technically challenging procedure, it is a less invasive intervention that provides maintenance of the sensory and motor function of the lower limb and the hemodynamic profile [7,8]. Patient-controlled analgesia is recommended for patients planned for gynecological surgery for postoperative analgesia, since it has a minor effect on respiration [6]. Effective management of postoperative pain is critical against chronic pain [9]. Unless relief of postoperative pain is possible, not only discharge from hospital is delayed, but also narcotic consumption and recovery time will be increased [10]. The purpose of the current study was to evaluate the efficacies of transversus abdominis plane block and epidural analgesia in patients operated for gynaecologic malignancies.

Material and Methods

This retrospective study was performed in the anesthesiology & reanimation and obstetrics & gynecology departments of a university hospital. Ethical approval was obtained from the institutional review board before the study. Adherence to the principles announced in the revised version of the Helsinki Declaration was provided.

Medical files of patients treated surgically for gynecologic malignancies were retrospectively reviewed. Patients deemed eligible for this study were ≥ 18 years of age and had an American Society of Anesthesiologists (ASA) status of 1-3. Exclusion criteria were drug allergy, chronic pain, diabetes mellitus, ischemic heart disease, chronic obstructive pulmonary disease, coagulopathy or a surgical incision extending beyond the T10 dermatome. After an overnight fasting period, patients were premedicated with alprazolam 0.25 mg and ranitidine 150 mg orally the night before and 2 hours before surgery. Standard monitoring involved electrocardiogram, non-invasive arterial blood pressure, arterial oxygen saturation, and end-tidal carbon dioxide monitoring.

The regimen for epidural analgesia and TAP block was applied in the relevant literature [1]. Accordingly, a catheter was placed in the thoracic region at the level of T9–T11 before the operation in the epidural analgesia group. General anesthesia was induced with intravenous propofol (1.5–2 mg/kg) and fentanyl (1–2 μg/kg). In the TAP block group, general anesthesia was induced and maintained as described before using the same procedure as in the epidural group. At the end of the surgery, while the patient was still anaesthetized, the patient received a TAP block.

The median incision was performed routinely in all surgical procedures. All patients received tramadol HCl, dexketoprofen and paracetamol 5 minutes before the cessation of general anesthesia. Patient-controlled epidural analgesia (PCEA) was initiated half an hour before the end of the operation. Patient-controlled epidural analgesia was administered as follows: Bupivacaine (100 g) was diluted in 100 ml of isotonic saline yielding a dose of 1 mg/ml. The lock out time was 30 minutes and the infusion was set at a dose of 1.5 mg/hour. Therefore, the total dose per hour was adjusted to 3.5 mg. An anaesthesiologist who was not recruited in the clinical management of patients, prepared anesthetic solutions and scheduled the PCEA pump. For TAP block, 12.5 ml of bupivacaine and 2.5 ml of lidocaine were diluted with 20 ml of isotonic saline. In overweight and obese patients, TAP block was performed under ultrasonographic guidance.

Patients were allocated into three groups according to the care regimen: Group I (n=25) was composed of patients who had PCEA, Group II (n=25) underwent TAP block, whereas Group III (n=24) did not have any additional procedures. Variables under investigation included age, body-mass index (BMI), ASA score, comorbidities, durations of operation, hospitalization and intensive care unit stay, visual analog scale (VAS) for pain, gastrointestinal findings such as nausea, vomiting, and defecation were noted on 1st, 2nd, 3rd, 6th, 12th and 24th hours postoperatively. Furthermore, cardiovascular system indicators such as systolic and diastolic blood pressures, pulse rate and peripheral capillary oxygen saturation were recorded.

Statistical analysis

Descriptive data were expressed as mean, standard deviation, median, minimum and maximum values. Categorical variables were expressed as numbers and percentages. Comparison of groups was carried out via one-way analysis of variance (ANOVA) if parametric test assumptions were met, or performed with the Kruskal-Wallis test if parametric assumptions were not met. If a difference was determined between groups, comparisons were made to identify the group that causes the difference. The Chi-square test was used to assess categorical variables. The level of significance was set at a p-value <0.05. Data were analyzed using the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 21.

Results

Table 1 presents a comparative view of baseline descriptives and perioperative data in 3 groups. Three groups under investigation were similar regarding age (p=0.508), BMI (p=0.491), and ASA scores (p=0.797). In contrast, there were significant differences between the 3 groups concerning durations of operation (p=0.001) and recovery (p=0.028). The

Table 1. Baseline descriptives and perioperative information for 3 groups.

Variable		Group			p-value
		I (n=25)	II (n=25)	III (n=24)	
Age	Mean±SD	53.48±129	53.40±126	49.88±11.0	0.508
BMI	Mean±SD	30.32±5.25	32.52±8.31	30.77±6.65	0.491
ASA	Mean±SD	1.88±0.67	1.76±0.66	1.79±0.66	0.797
Duration of operation	Mean±SD	240.21a ±80.97	173.40b± 66.88	169.17b± 61.07	0.001
Duration of recovery	Mean±SD	10.36±7.91	7.52±7.31	7.13±7.30	0.028
ICU stay	Mean±SD	0,36±0,86	0,20±0,50	0,21±0,51	0.892

(BMI: body-mass index; ASA: American Society of Anaesthesiologists; ICU: intensive care unit; SD: Standart deviation)

Table 2. Comparative overview of patient characteristics in age groups.

Variable		Age group		p-value
		<55	≥55	
BMI (kg/m2)	<25	10 (21.3%)	3 (11.1%)	0.269
	≥25	37 (78.7%)	24 (88.9%)	
ASA score	I	23 (48.9%)	1 (3.7%)	<0.001
	II	23 (48.9%)	17 (63%)	
	III	1 (2.1%)	9 (33.3%)	
Comorbidity	No	24 (51.1%)	1 (3.7%)	>0.001
	Yes	23 (48.9%)	26 (96.3%)	
ICU stay	No	42 (89.4%)	19 (70.4%)	0.039
	Yes	5 (11.6%)	8 (29.6%)	
Duration of operation (hours)*		3.0±1.3	3.7±1.2	0.013
Duration of hospitalization (days)**		5.0-5.0	7.0-7.0	0.012

(BMI: body-mass index; ASA: American Society of Anesthesiologists; ICU: intensive care unit; *: expressed as median±standard deviation; **: median-interquartile range)

Table 3. Comparative overview of patient characteristics in BMI groups.

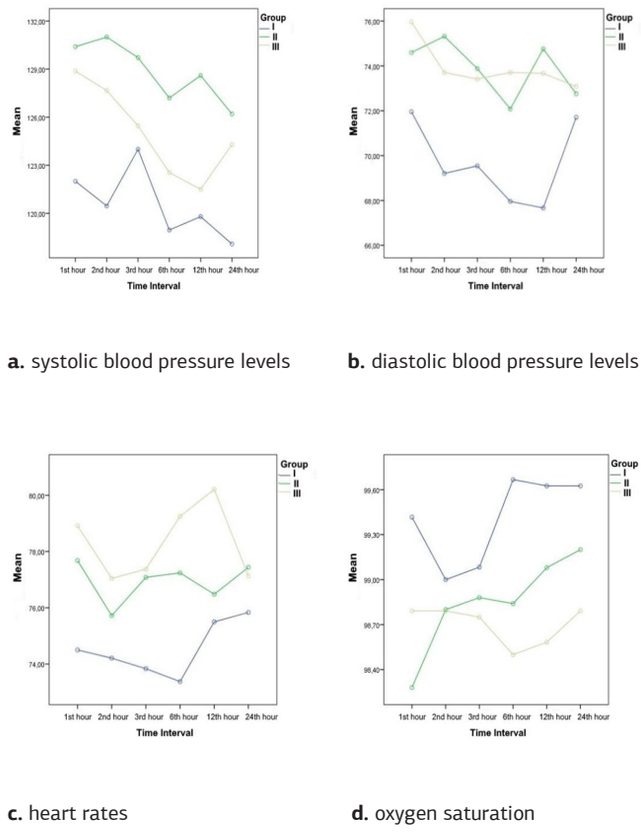
Variable		BMI group		p-value
		<25	≥25	
ASA score	I	9 (69.2%)	15 (24.6%)	0.008
	II	3 (23.1%)	37 (60.7%)	
	III	1 (7.7%)	9 (14.8%)	
Comorbidity	No	9 (69.2%)	16 (26.2%)	0.003
	Yes	4 (30.8%)	45 (73.4%)	
ICU stay	No	11 (84.6%)	50 (82%)	0.820
	Yes	2 (15.4%)	11 (18%)	
Duration of operation (hours)*		2.7±1.1	3.3±1.3	0.105
Duration of hospitalization (days)**		5.0-2.0	6.0-5.0	0.065

(BMI: body-mass index; ASA: American Society of Anesthesiologists; ICU: intensive care unit; *: expressed as median±standard deviation; **: median-interquartile range)

duration of operation and recovery were remarkably longer in Group I who had PCEA.

The most common diseases diagnosed were hypertension (n=26; 35.6%), cardiovascular system diseases such as deep venous thrombosis (n=13; 17.8%) and diabetes mellitus (n=6; 8.2%).

The measurements for systolic blood pressure at various time intervals indicated that there was no statistically significant difference between the 3 groups. Diastolic blood pressure values measured over 24 hours yielded that Group I had remarkably lower results on the 12th hour (p=0.011). The heart rates were measured in 3 groups, and there was



a. systolic blood pressure levels **b.** diastolic blood pressure levels

c. heart rates **d.** oxygen saturation

Figure 1. Comparison of systolic blood pressure, diastolic blood pressure levels, heart rates and oxygen saturation various time intervals in 3 groups.

no statisticallysignificant difference between groups at any periods under focus. Comparison of oxygen saturation values between 3 groups demonstrated that there were significant differences between 3 groups on 6th and 12th hours (p=0.022, and p=0.033, respectively). Group I displayed the highest values for oxygen saturation at these time intervals, while Group III had the lowest values (Figure 1).

The level of pain as reflected by VAS demonstrated that it was different between groups in the 3rd hour. It was lowest in Group II and highest in Group III (p=0.017). There was no significant difference between the 3 groups regarding Ramsey scores. Patients in Group III exhibited a more common rate of nausea and vomiting at the 2nd hour (p=0.030). There was no difference between the 3 groups concerning the return of defecation function.

Patients ≥55 years of age had higher ASA scores (p<0.001), more comorbidities (p<0.001) and longer stay in ICU (p=0.039). Durations of operation and hospitalization were also longer in patients ≥55 years (p=0.013; and p=0.012, respectively) (Table 2). Visual analog scale for pain was higher in patients younger than 55 years at 12 hours (p=0.003) and 24 hours (p=0.028). The Ramsay sedation scale in patients <55 years was notably higher at 12 hours after surgery (p=0.038). Additional drug use was needed more in these patients (<55 years) by the 12th hour (p=0.013). Systolic pressure at the 6th hour was remarkably higher in older patients (≥55 years). Patients with BMI ≥25 had higher ASA scores (p=0.008) and had a higher incidence of comorbidities (p=0.003). VAS scores on 1st (p=0.024) and 2nd (p=0.004) hours were also higher in these cases (Table 3).

Discussion

Insufficient relief of post-operative pain is associated with delayed recovery, increased health care costs and diminished patient satisfaction. Different adjuvants are utilized in regional anesthesia to facilitate and prolong local anesthetic analgesia and reduce opioid requirements and their side effects. Epidural analgesia may relieve both somatic (abdominal wall wound) and visceral (uterus) components of pain, while the TAP block is more likely to alleviate pain originating from the abdominal wall only [6,11].

The current trial was performed to investigate the efficacies of epidural analgesia and TAP block in patients operated for gynaecologic malignancies. Our results demonstrated that both of these methods provided effective relief of pain postoperatively, and sedation scores were similar between the groups receiving TAP block or epidural analgesia. The need for additional medications was more apparent, and nausea and vomiting were more evident in patients who did not undergo TAP block or epidural analgesia. Cardiovascular profiles and hemodynamic parameters were not adversely influenced by TAP block and epidural analgesia. Advanced age (≥55) was associated with prolonged hospital stay and longer duration of operation, while obesity (BMI≥25 kg/m2) was linked with higher ASA status and additional comorbidities.

The mode of anesthesia induction can affect the total anesthetic consumption with PCEA and the efficiency of analgesia [5]. The combination of an epidural opioid-local anesthetic provides good pain control during the first post-operative day, but is associated with nausea, vomiting, sedation, pruritus, urinary retention and respiratory depression [11].

The TAP block involves the sensory nerve supply of the anterior-lateral abdominal wall, in which the T7-12 intercostal nerves, the ilioinguinal and iliohypogastric nerves, and the lateral cutaneous branches of the dorsal rami of L1-3 are blocked. The efficacy of TAP block may be limited due to obesity, and ultrasonographic guidance may not be sufficient due to the difficulty of placement. The beneficial effects of the TAP block at the time of laparotomy and laparoscopy have been demonstrated in previous publications. Nevertheless, the additional time under anesthesia constitutes a disadvantage for the patient. The TAP block was found to be a safe method, which does not increase the likelihood of any adverse effects or increase in postoperative complications [10,12].

Improved pain management and quality of life as well as decreased costs due to prolonged hospitalization are the main advantages of procedures such as epidural analgesia and transversus abdominis plane block. Close collaboration between surgical and anesthesia pain management teams is necessary for the establishment of appropriate management [10].

Transversus abdominis plane block offers the advantage of providing analgesia without the addition of morphine PCA. It provides effective analgesia especially if the procedure is shifted to open surgery. TAP block is non-sedating and has minimal effect on the cardiovascular system, sparing the motor function of lower limbs. Compared with epidural analgesia, TAP analgesia does not disturb hemodynamic imbalance and is suitable for use in patients on anticoagulation medication. TAP block does not necessitate intensive nursing care. Thus, it avoids the side-effects of opioids administered by the intrathecal route, including urinary retention. Patients with epidural analgesia may need re-catheterization attributed to urinary retention. On the other hand, TAP analgesia does not alleviate visceral pain, and this can be a significant problem in some cases [1].

Epidural analgesia is supposed to be the most effective method for the relief of pain in labor. Our data support that PCEA may be a safe, convenient and effective analgesic option in the postoperative care of patients operated for gynecologic malignancies. It seems to significantly prolong the duration of operation and recovery. Owing to the systemic diseases to be encountered in a relatively elderly patient group, this point must be taken into account during planning the protocol for pain relief. Epidural analgesia not only diminishes the workload, but also reduces the number of interventions and improves the satisfaction of the patient [13]. In the literature, comparison of epidural versus TAP block for postoperative analgesia after abdominal surgery did not yield any differences concerning pain scores [14].

The main limitations of the current trial include retrospective design, small sample size, and data restricted to the experience of a single institution. Therefore, our results must be interpreted cautiously, and extrapolations to larger populations must be made carefully.

Conclusion

Results of the present study indicated that TAP block and epidural analgesia yield safe and effective modes for postoperative analgesia in gynaecologic malignancies. Close collaboration between surgical and anesthesia teams is mandatory for the appropriate selection of patients and the development of guidelines.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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